

Money & Energy Saving Resources from the



CALIFORNIA ENERGY COMMISSION

ENHANCED

AUTOMATION

Business Case Guidebook

TABLE OF CONTENTS

Preface	1
1. Introduction	2
2. Top 10 Reasons for Investing in Enhanced Automation	4
3. Enhanced Automation Primer	7
4. Facility Assessment	9
5. Economic Assessment	12
6. Implementation Plan: Let's Go Treasure Hunting	14
7. Additional Resources	16



PREFACE

Acknowledgements

The California Energy Commission contracted XENERGY Inc. and Nexant, Inc. to develop materials for increasing the awareness of California businesses about the costs and benefits of enhanced automation technologies. National energy writer Glen Hatzai edited this guidebook. This guidebook also received input from California Energy Commission staff members Mike Messenger and Claudia Chandler, Energy Solutions, and Linda Brandon Designs. The following trade allies offered feedback on these materials: CMS Viron, Encompass, Engage Networks, Global Energy Partners, ICF Consulting, Lawrence Berkeley National Laboratory, Northwest Energy Efficiency Council, Sieben Energy Associates, Silicon Energy, and Southern California Edison.

Overview¹

This guidebook is designed for executives and financial officers interested in enhanced building automation controls. Enhanced automation, as covered in this guidebook, refers to a variety of strategies to increase the capability of your existing energy or building management systems to control current, and plan for future, building energy costs while maintaining the comfort and productivity of all building occupants.

Other Resources

The California Energy Commission offers additional sources of information for enhanced automation. Enhanced automation project staff will answer questions about enhanced automation, can set up a free telephone consultation with a technical advisor, or provide additional materials that include vendor lists and case studies on successful projects. In addition, the *Technical Options Guidebook* provides a technical description of enhanced automation technologies and guidelines for implementation.

Target Audience

Businesses most likely to benefit from enhanced automation typically have 200 kW or more of electric load in their aggregate building space (roughly equivalent to 20,000 square feet of space or greater). Customers with 1 MW or more of load should find enhanced automation particularly cost effective due to economies of scale. Businesses with under 200 kW of load should check the California Energy Commission's web site at www.energy.ca.gov for programs better suited to smaller businesses.

Types of buildings most likely to benefit from enhanced automation include:

- Grocery stores
- Hospitals/health care facilities
- Hotels
- Office buildings
- Retail chain stores
- Schools/colleges
- Others, such as multiple building complexes.

Business professionals who will benefit from reading this guidebook include:

- Building/business owners
- Chief executive officers
- Chief financial officers
- Consultants
- Facilities directors
- Operations directors
- Property owners/managers.

To reach the California Energy Commission's Enhanced Automation Project:

- (866) 732-5591
- enhancedautomation@xenergy.com
- www.ConsumerEnergyCenter.org/enhancedautomation

¹ The information in this guidebook is designed as an overview and is subject to change. The California Energy Commission, XENERGY Inc., and Nexant, Inc. make no warranties, expressed or implied, and assume no legal liability or responsibility for the accuracy, completeness, or usefulness of any information provided within this guidebook. The views and opinions expressed herein do not necessarily state or reflect those of the State of California, any agency thereof, or any of the organizations or individuals that have offered comments as this guidebook was being developed. All of the content provided in this guidebook, including descriptions, cost and savings estimates, and Internet web site addresses, are as accurate as possible as of May 2002.

Rewards Beyond Energy Savings

This guidebook was developed by the California Energy Commission for property and business owners, financial officers, and chief executives to serve as an executive's guide to uncovering new opportunities for gains in building performance using the latest advancements in building automation technology.

Energy savings and conservation are a given in today's competitive business models. Business owners and property managers know intuitively that adhering to sound energy policies and practices is simply good business, both in terms of cost reduction and corporate/community responsibility.

But even the savviest executives may not be aware of the exceptional benefits of enhanced automation now offered by many of the controls industry's newest developments. Few executives have the time or the expertise needed to understand and assess the true potential of these enhancements as they relate to their own facilities.²

For these reasons, the California Energy Commission has assembled this executive's manual to help you and your organization:

- Evaluate how well your building now employs automation;
- Assess the optimum level of enhanced automation for your facility; and
- Determine what rewards are possible and what makes good business sense by implementing new enhanced automation strategies.

The advantages of enhanced automation parallel most organizational missions—to be 'best in class.'

If you expect your people to realize their full potential, why not expect the same of one of your most visible assets—your building?

Enhanced automation:

technologies that increase the capability of your existing energy or building management system. See page 8 for a more detailed definition.

A few of the many rewards enhanced automation can deliver:

- Employee satisfaction and productivity gains from the highest quality working environment;
- Higher property values with “showcased” amenities;
- Attraction of more customers, tenants, visitors, and employees;
- Financial gains from reduced labor and operating costs;
- Incentives that can offset the costs of enhanced automation;³
- And, of course, energy savings and conservation.

² Facilities most likely to benefit from enhanced automation typically have a minimum electrical load of 200kW and a minimum of about 20,000 square feet of space. Generally, the greater the energy usage and the larger the building, the greater the potential benefits.

³ The actual percentage available to your organization will vary depending on a variety of factors. However, the California Energy Commission has case studies that document enhanced automation projects with incentives awarded ranging from 22 percent to as high as 88 percent of the project costs.

What you will find inside this Guidebook

Section 2: Top 10 Reasons for Investing in Enhanced Automation

Ten reasons why you should consider enhanced automation for your building or campus.

Section 3: Enhanced Automation Primer

A concise review of what you need to know about enhanced automation to reap its rewards.

Section 4: Facility Assessment

An initial methodology for evaluating and assessing your own building's enhanced automation potential.

Section 5: Economic Assessment

A simplified economic approach to assessing the relative costs and benefits of specific enhanced automation strategies for your facility.

Section 6: Implementation Plan: Let's Go Treasure Hunting

A short guide on how to initiate an enhanced automation project that ensures success with the optimum rewards.

Section 7: Additional Resources

Where to go for more detailed information on technologies, potential funding, and implementation.

Discovering new opportunities with enhanced automation is like “treasure hunting” for significant rewards, without ever leaving the building.





As with your employees, your facilities make one of the strongest and most visible statements about your organization, reflecting how much your organization invests in and cares for its assets.

Organizations intent on thriving are making enhanced automation an integral part of their business strategy and long-term mission. This is because recent advances in enhanced automation technologies have made what was once only an impractical goal in terms of comfort and efficiency now affordable and realistic.

As a result, there are a number of compelling reasons why you should seriously consider investing in enhanced automation. We present 10.

1. Reduced costs/profit improvement

The most immediate and measurable benefit of enhanced automation strategies is the reduction of energy costs through more control over facilities and equipment. Examples include temporary load reduction during high-priced peak periods or when load-curtailement incentives are offered, response to real-time price signals, and greater zone control to better balance occupancy and usage patterns. In many instances, enhanced automation strategies generate savings that return the cost of the improvements over time.

The financial benefits of enhanced automation go well beyond energy savings and energy conservation. Improved facility management translates to increased productivity and lower labor costs.

Preventive/predictive maintenance programs are most effective at extending equipment life and reducing downtime. Further, enhanced automation often reduces the frequency of occupant complaints, decreasing the associated labor and overhead costs as well.

Enhanced automation technology has raised the bar for both building performance and organizational efficiency.

Cost avoidance must also be counted among the financial benefits of enhanced automation. The costs for emergency repairs and lost productivity, for example, can be not only exorbitant, but may be unacceptable for organizations involved in critical businesses, such as laboratory research, healthcare, or high-reliability manufacturing.

2. Greater occupant comfort and satisfaction

Enhanced environmental control can increase occupant comfort, satisfaction, and productivity. Enhanced automation is one of the simplest ways to improve control of conditions in specific building locations through more precise zone control over temperature and lighting.

2. TOP 10 REASONS FOR INVESTING IN ENHANCED AUTOMATION

Although occupant complaint levels often drop noticeably after enhanced automation technologies are employed, the response time to complaints is also shortened considerably. In many cases, abnormal conditions are either addressed before they occur or eliminated entirely.

Organizations that employ the most advanced building technologies make a lasting impression on customers, tenants, employees, and visitors alike.

3. Increased safety and security

For most organizations today, reducing the risks associated with occupant safety and security is a high priority. Enhanced automation technologies are surprisingly effective in addressing these issues. When controls for such systems as fire alarm and smoke detection, entry access, motion/intrusion detection, and closed-circuit television are integrated with a centralized automation system, they are able to work more effectively and interact by sharing critical information. Enhanced automation can also help reduce false alarms due to misinformation, further increasing safety and productivity.

4. Improved information management

Accurate, reliable information is essential to making timely, informed decisions. Enhanced automation provides a reliable means of collecting and assembling a variety of operating data and archiving those data into a central database for evaluation, reporting, energy forecasting, and negotiating with power marketers. In addition, specific areas of your facility can be more easily targeted for improvements. Operations can be tracked more effectively for improved maintenance or validated to better comply with regulatory guidelines and industry requirements. Moreover, the better the information you have about how your building operates, the easier it will be to find new opportunities to reduce even more costs. Enhanced automation also gives you the capability to model new ideas before they are implemented.

5. Increased access to information

If accurate information is key to effective management, then easy access to that information is equally critical. Enhanced automation allows access to specific operating information, virtually anywhere in a facility or on campus, that was previously either difficult or cost-prohibitive to retrieve. This is an effective weapon for attacking deferred maintenance issues for older buildings. In such cases, customized diagnostic routines can be developed to predict, troubleshoot, and otherwise avoid equipment failure.

Real-time operating data can be invaluable as well. Enhanced automation can provide access to specific conditions to determine exactly what happened, where, and why. The system can apply immediate measures to correct the problem and prevent it from happening again.

6. Improved electrical service

Reliability of electrical service is an ongoing issue in California. Enhanced automation can help you better respond to potential emergency curtailments by protecting critical systems and by shedding or shifting discretionary loads. This limits production losses and other costs associated with power disruptions. You will also be better equipped to participate in local or regional cooperatives to effect real-time control over power requirements during critical periods.

2. TOP 10 REASONS FOR INVESTING IN ENHANCED AUTOMATION

Have you heard?

Enhanced automation gives the Doubletree Hotel Sacramento an edge against shortages and blackouts while reducing energy costs by over 10 percent.

For the full story, see Enhanced Automation Case Study 6.



7. Increased property values

For organizations striving to be ‘best in class,’ investing in enhanced automation can be a key strategy for success. Incorporating the latest and most advanced technologies into a building adds to the overall value and attractiveness of the facility and increases the property’s market value. Top executives know that the best amenities are needed to help draw tenants, students, and clients and to attract the highest quality employees. Organizations that have these amenities enjoy greater visibility and showcase their facilities within their respective marketplaces.

8. Optimized facility control

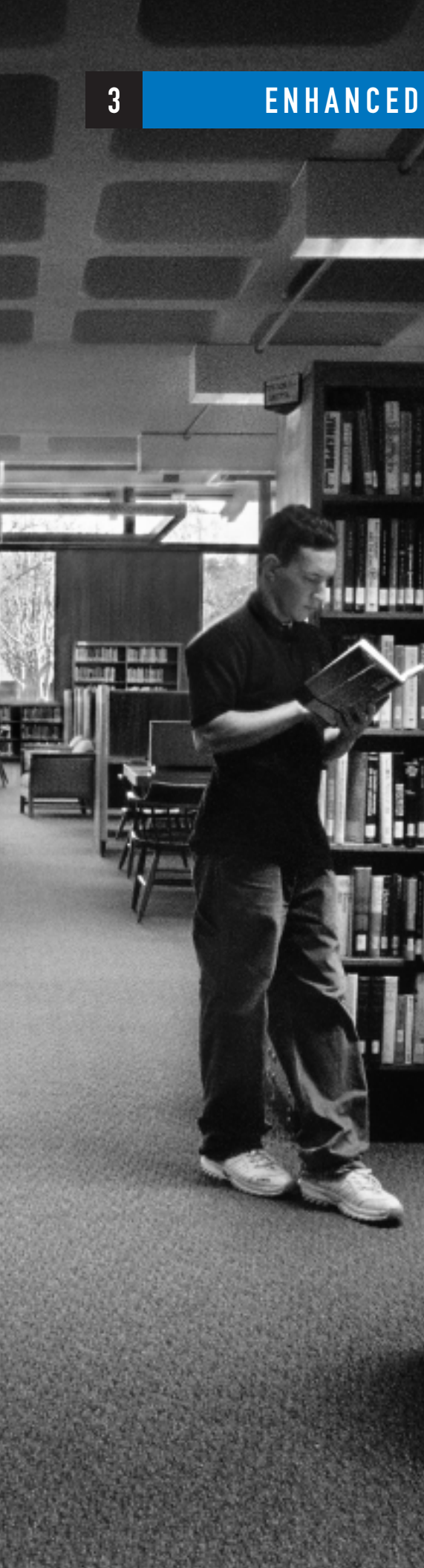
Enhanced automation can provide one of the most desirable concepts in building management: single-seat navigation, where all systems and facilities can be viewed from one workstation. From a facility management perspective, it is the most cost-efficient and ideal way to run a building. Productivity is increased because the building staff is more effective. The need for expensive, after-hours labor can often be reduced significantly as well.

9. Asset protection

Enhanced automation enables advanced preventive/predictive maintenance strategies to be put into place, which can extend the life of high-cost capital equipment. With access to the right performance data, failures can be more easily predicted and prevented.

10. Higher productivity

Every executive is challenged to manage more buildings with the same or fewer resources. The ability to dispatch the right person to the exact location at the precise time—and only when needed—is a sure way to reduce or eliminate wasted time. In addition, enhanced automation can provide the information necessary to identify the problems or conditions at each location before action is taken. Personnel are better prepared to perform their duties, and in less time.



Enhanced automation is any improvement in technology that increases the capability of your existing energy or building management system. Essentially, there are three levels of enhanced automation functionality—standard, high, and premium—each offering progressively more value to your investment. As functionality increases, so does control over power usage and the ability to plan for future building energy costs while maintaining and/or improving occupant comfort, satisfaction, security, and productivity.

Several technologies are included under enhanced automation, including energy management systems (EMS), energy information systems (EIS), as well as heating, ventilation and air conditioning (HVAC) and lighting controls. The following are ways to enhance automation in a building:

- Install a new EMS and/or EIS system or replace existing system.
- Optimize programming and integration of the existing system.
- Increase the amount of monitoring and control points for the existing system.

The enhanced automation graphic on the next page shows a sample of the range of technological options. The text within the figure shows some individual components of an enhanced automation system that all integrate into an EMS/EIS. As shown, EMS and EIS systems can be combined and/or overlap or be configured as separate systems, communicating with each other as well as with the monitoring and control points in the building.

Individual system components can be implemented independently or in a staged, modular approach. Each additional component used in building controls offers increased economic and control benefits. Descriptions of the technologies follow the graphic. For more technical details concerning enhanced automation opportunities refer to the *Technical Options Guidebook*.

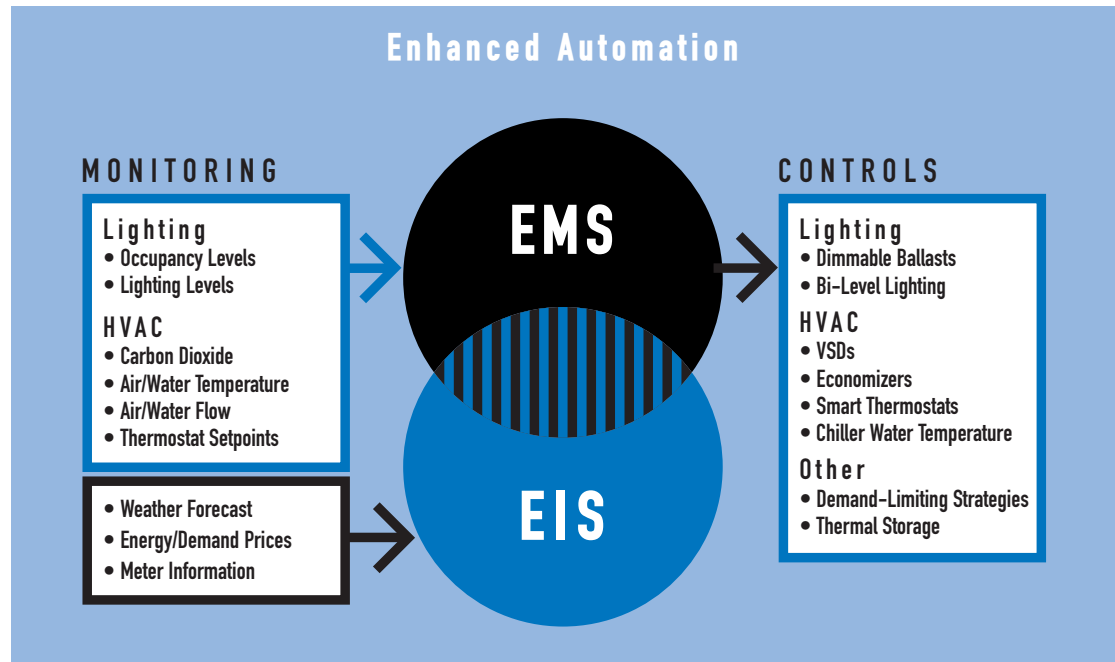
Levels of Enhanced Automation Functionality

STANDARD functionality refers to buildings with an existing EMS that provides centralized control for time and temperature with a sophisticated thermostat. The EMS may contain various schedules depending on time of year, zone use, time of day, complaints, or other factors. Centralized lighting control could be a part of the system to turn off lights during non-business hours.

HIGH functionality refers to buildings where the EMS gathers information to make operational efficiency decisions over such systems as HVAC and lighting. At this level of functionality, some EIS capabilities are present, such as notification from the utility on prices or staged emergencies.

PREMIUM functionality refers to buildings where the EIS assumes complete analysis and response functions. The EIS provides a gateway to the EMS, allowing automated response to price signals or demand-responsive requests. The EIS can also provide billing analysis and other reporting capabilities.

3. ENHANCED AUTOMATION PRIMER



Have you heard?

New enhanced automation technology, with centralized control, is helping a major retailer insulate itself from electricity price volatility, reap incentives, and manage power for 119 stores from a single web site.

For the full story, see Enhanced Automation Case Study 5.




EIS technologies are designed to provide building managers with information on system-wide performance, energy use, and utility pricing. They provide an additional layer of automation that allows for maximum control over energy usage. They can be directly linked to weather information, building meter data, and utility pricing data. An EIS can be completely independent of an EMS or can provide a gateway to an EMS. It is an integral part of utility-based demand-response programs (i.e., load scheduling, demand shifting, or load curtailment) and for real-time pricing programs.

EMS technologies are found in most buildings greater than 20,000 square feet. They are information and control systems that, through a series of sensors and controllers, allow a facility manager to operate end-use equipment efficiently within a facility. These control centers are often run from a centralized operations panel or remotely, such as via an Internet web page.

Enhanced HVAC technologies incorporate various control and monitoring strategies to improve temperature control and increase operating efficiency. HVAC measures also allow the system to respond to signals received through the EIS. Similar to lighting controls, these technologies can operate independently or be linked to an EMS/EIS system.

Enhanced lighting technologies include lighting control and monitoring strategies. These technologies can operate independently or be linked to an EMS/EIS system for maximum control. As with HVAC controls, demand-reduction strategies for lighting can operate independently or be programmed into an EMS/EIS system.



Once you have a basic understanding of enhanced automation technologies and benefits, consider the technologies that offer the greatest potential value to your building and your organization. It is important for you to be involved personally in the enhanced automation process at the outset. This ensures that the situational assessment of your facilities, operations, energy costs, and other technical details are conducted in accordance with your business objectives. Another key to success is collaboration among your organization's assessment team: the facility manager, building operator, and all others who can contribute expertise to the enhanced automation assessment process for your facility.⁴

Step 1. Inventory existing enhanced automation functions

To determine the costs and benefits of enhanced automation accurately, your assessment team will need a thorough understanding of the existing technologies in your facilities. Ask your facility engineers or those closest to the equipment for a detailed hardware and software analysis. Have your team conduct a facility walk-through, especially if numerous monitoring and control points are needed. They should identify specific needs, such as new equipment, replacements, or reprogramming. Invite enhanced automation vendors or third-party service providers to conduct an objective facility energy audit.

Step 2. Describe facilities and operations

Every organization and every facility has its own energy load profile where the peak demand can occur at different times. For instance, most offices experience peak demand midday; while retail facilities might peak during the evenings or on weekends; 24-hour facilities, such as hospitals, may have more consistent loads over time.

Studying your building's load profile and energy usage pattern is key to determining which enhanced automation functions are best suited to your facility and your needs. This will help you to be specific in developing measurable objectives in terms of what you expect to achieve with enhanced automation improvements. Establish which loads demand a reliable power source and are critical to operations or comfort and which are discretionary. Energy usage for discretionary end-uses or locations can be adjusted in response to price signals or maintenance schedules. Variable-use spaces, such as conference rooms or auditoriums, require special attention.

⁴ To complement your internal staff and resources, the California Energy Commission's Enhanced Automation Technical Assistance Hotline can supply valuable information and assistance. In addition, the *Technical Options Guidebook* provides more detailed information on enhanced automation technologies and their application.

4. FACILITY ASSESSMENT

Step 3. Determine your utility pricing plan

The rates that various electric utilities charge differ by the size and type of customer.

Customers who want to lower their costs by switching to dynamic pricing (i.e., real-time pricing or critical-period pricing) or by participating in a demand-response program will often achieve higher returns from enhanced automation investments.

You will also want to review your facility's energy bills to determine on what basis you are charged for energy and what additional fees or tariffs you are being charged. If there are enhanced automation functions that allow you to benefit from a different rate structure, first determine if it is possible to switch rates. Multi-site businesses should explore bill consolidation options as well.

Common Utility Pricing Plans for Large Customers

ENERGY AND DEMAND: Customer pays rates for both energy use and the facility's peak demand.

TIME-OF-USE (TOU): Customer pays preset rates for energy and demand that are lower during off-peak and higher during seasonal/daily peak demand periods. TOU structures are often mandatory for very large commercial/industrial customers and voluntary for other customers.

REAL-TIME PRICING (RTP): Customer pays according to hourly pricing of electricity where the cost per kWh varies by hour and by day and therefore is less predictable than TOU rates. Under one structure, the utility gives customers a 24-hour price forecast each day for the following day, allowing them to adjust usage daily to minimize costs. Typically, RTP is tied to the wholesale market price.

Step 4. Calculate facility size and load

The seasonal peak demand that your facility places on the power grid, as measured by the utility, often determines rate structures. Find this information on your utility bill; in California, for larger commercial buildings, the peak demand will usually be set in the summer months. If this peak demand information is unknown, estimate it by assuming 4 kW per 1,000 square feet of floor space.

Typically, enhanced automation investments provide higher returns for businesses with higher energy usage. In many cases, these investments have attractive payback scenarios. Enhanced automation suppliers should be able to calculate estimates for you in advance.

Step 5. Assess the total campus

The cost-effectiveness of enhanced automation measures improves as the number of business locations or meters increases. Therefore, the greater the complexity of your campus or functions, the greater the benefits of using enhanced automation to control those facilities and functions from a central location. Multi-site businesses also have additional opportunities with enhanced automation to save on their energy costs, particularly under dynamic pricing programs.

Step 6. Determine the facility's age

The year your building was constructed provides an indication of the construction materials used and the types of mechanical equipment and controls that were originally installed. Title 24, the California Energy Code, requires certain levels of control functions for new buildings and has been updated numerous times. For example, 25 years ago buildings were not required to have controls, while significant controls are mandatory now. If the building was extensively remodeled and/or the HVAC system has been extensively renovated, your estimate of potential enhanced automation value should reflect this upgrade. Also, if you are considering any major retrofit in the near future, the economics of enhanced automation often make sense to consider as well. Major renovations require owners to upgrade their buildings to Title 24 standards; therefore, enhanced automation investments may require only small incremental costs.

Have you heard?

Alameda County applied enhanced automation to its five largest municipal facilities, cutting energy costs and reducing vulnerability to volatile energy markets.

For the full story, see Enhanced Automation Case Study 1.



Step 7. Set specific enhanced automation objectives

Although enhanced automation strategies for your building's energy monitoring and control systems are often driven by the pursuit of energy cost savings, they also serve as solutions to other challenges senior executives currently face. (See the Top 10 Reasons for Investing in Enhanced Automation section.)

The qualitative and quantitative values of enhanced automation benefits vary with the organization and the facility. Some businesses may be concerned principally with cost reduction, while others have goals that involve improvements to employee satisfaction and productivity, increases in property value, or improvements to safety and security. Prioritize the potential benefits of enhanced automation strategies as they relate to your facilities and specify your expectations for outcomes in terms that are meaningful to your organization.

Business Case Template

Visit the California Energy Commission's enhanced automation web site, <http://www.ConsumerEnergyCenter.com/enhancedautomation>, to download a template with the major costs and benefit categories. Businesses can enter their specific building characteristics in the template, which will suggest enhanced automation options, along with economic evaluations.

There are two primary factors in assessing the potential economic values of enhanced automation strategies: the costs associated with the technology itself and the quantitative value of the benefits derived, directly and/or indirectly. Many of the benefits of such strategic improvements are indirect; that is, the benefits are qualitative and may not be as quantifiable or apparent as energy savings. Your challenge is to ensure that the values of both direct and indirect benefits, as they relate to your organization's business and mission, are given the appropriate weight by those performing the assessment. In addition, switching to dynamic pricing can also provide opportunities to reduce energy costs. Also, incentives are often available to help offset project costs.⁵

The cost of the technologies you have chosen must also be factored with forecasts of energy prices and labor (for operation and maintenance and other affected functions), which will depend on the financial and/or business analyst in your organization. Use the same financial evaluation methods here as you would for other company investments, such as net present value, internal rate of return, or payback period.

There are a number of variables that will affect the enhanced automation technologies you choose, as well as the economic results you derive from them. The most obvious variable is the price of energy, or more

specifically, the commodity portion of the electric rate that you pay. Other variables include building usage and occupancy, utility rate, and the availability of incentives.

Have you heard?

With this one (enhanced automation) project, we have increased building value and accomplished a desirable social objective. Very satisfying.

JOHN BUCHANAN,
MACANAN INVESTMENTS

For the full story, see Enhanced Automation Case Study 3.

The less certain these variables are (e.g., energy prices or occupancy rates), the greater the need for a sensitivity analysis. Calculations with alternative expected values of key inputs should be made to see how much the outcome changes as a result. One method is to use values within the ranges for the costs or benefits for various enhanced automation strategies. (Refer to the *Technical Options Guidebook* for details.) The same should be done for the non-energy benefits. As with any business decision, if changing key parameters can affect the final investment decision, the probability of the different unwanted scenarios happening should be considered before making the choice.

The following table summarizes the costs after incentives, available energy savings, and non-energy benefits of specific case studies in California where enhanced automation strategies have been applied.

⁵ For more information on incentives available, please refer to the Additional Resources section at the end of this document, or contact the Enhanced Automation Hotline at (866) 732-5591 or enhancedautomation@xenergy.com.

Successful Enhanced Automation Projects						
Case Study	Type of Facility	Level of Functionality	Incentives Received	Cost after Incentives	Annual Savings	Other Benefits
1	Municipal, multi-site	High	\$260,000	\$20,000	up to \$70,000	Real-time data, improved occupant comfort
2	Corporate campus	Premium	\$212,000	\$63,000	up to \$70,000	Reduced labor costs for energy
3	Commercial building	High	\$78,000	\$280,000	\$114,000	Increased awareness & building value
4	College campus	Premium	\$250,000	\$32,000	\$30,000	Troubleshooting, analysis
5	Large retail chain	Premium	\$300,000	\$20,000	up to \$140,000	Remote access and control
6	Hotel	High	N/A	\$48,000	\$64,000	Improved guest relations

Direct Benefits

There are often direct benefits of enhanced automation that should be factored into your economic assessment that are not as easily quantified as energy savings. Among these benefits are increased building operator productivity and decreased maintenance costs (materials and labor). Enhanced automation provides more building information and greater control from a centralized location, which speeds identification of problem areas, improves data management, and enables more effective preventive/predictive maintenance. In addition, enhanced automation is often credited with avoiding or eliminating equipment downtime, which can be critical for such organizations as hospitals, data centers, cleanrooms, etc.

Other qualitative enhanced automation benefits that should be factored into the assessment include improved occupant comfort and productivity, energy delivery reliability, enhanced corporate image, and societal benefits. Improved comfort and indoor air quality result from better control of fresh air supply and exhaust. Improved lighting controls can improve the quality of light while reducing energy costs. The ability to curtail demand on short notice can reduce the risk of rolling brownouts or blackouts.

Utility Pricing Alternatives

As discussed in the prior section, electric utilities provide a variety of rate structures. Review your current rate structure to determine if you are receiving the most appropriate rate for your usage as some dynamic pricing strategies may provide additional opportunities to save energy and reduce costs. Pursuing enhanced automation can allow you to benefit from a different rate structure as well. Be sure your organization researches the availability of these opportunities thoroughly prior to completing an economic assessment.

Program Incentives

Government agencies and utilities often provide valuable incentives for undertaking upgrades through energy-efficiency or demand-reduction programs. Such incentives can affect the economics of enhanced automation quite favorably. For more information on incentives available, please refer to the Additional Resources section at the end of this document, or contact the Enhanced Automation Hotline at (866) 732-5591 or enhancedautomation@xenergy.com.

O

nce you have determined that the benefits of enhanced automation can be significant to your organization, it's time for you to reap the rewards. Once the team of technical and financial experts in your organization is assembled and you have determined that upgrades are feasible, consider these guidelines for costs and savings:

Have you heard?

Hewlett-Packard cuts annual energy costs by \$1.5 million; employee comfort and satisfaction increase.

For the full story, see Enhanced Automation Case Study 2.

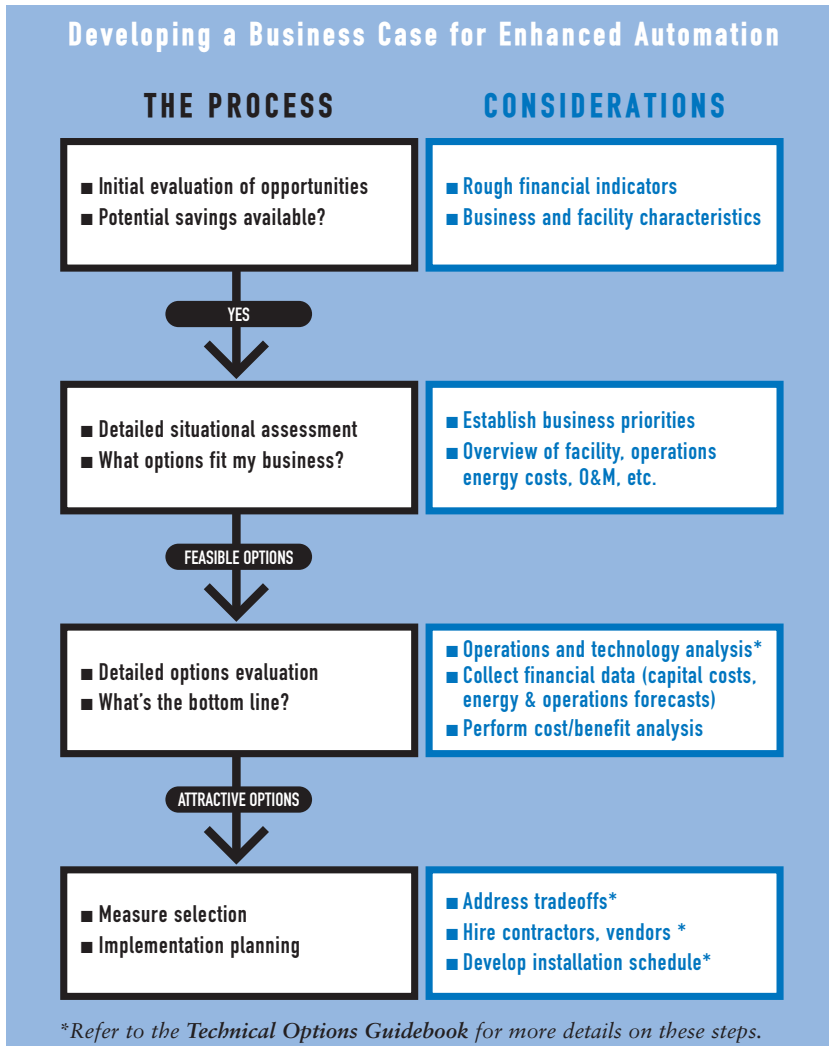
■ For commercial buildings in California, the average cost of electricity and gas for HVAC and lighting averages between \$1 and \$2 per square foot of floor space. The potential for average annual energy savings from an enhanced automation retrofit will vary between 5¢ and 30¢ per square foot, with an average around 15¢ per square foot. Businesses may find that an investment of \$1 per square foot (over 5 years) will provide a reasonable return when considering *all* of the potential benefits of enhanced automation, including indirect or non-energy-related benefits.

- Try estimating control system installation costs using an average cost of \$1,100 per control point (any point of control and monitoring in your facility that provides information and is linked to the system). Note: there are many variables and technical factors that affect costs using this approach. Refer to the *Technical Options Guidebook* for details.
- Energy savings resulting from the installation of a control system can range from 10 to 15 percent of total energy use when an aging or poorly operating/maintained system is upgraded.
- For every \$1,000 spent on hardware hookup for energy information systems, expect an additional \$50 to \$100 in monthly service and maintenance costs (although energy and labor savings will be many times greater).

For a more detailed cost/benefit overview, the California Energy Commission's enhanced automation web site, www.ConsumerEnergyCenter.com/enhancedautomation, includes a spreadsheet tool for download. The Enhanced Automation Hotline can provide additional resources as well.

The following graphic illustrates the financial and technical analyses that help to identify the most appropriate enhanced automation options relative to business and facility characteristics.

6. IMPLEMENTATION: LET'S GO TREASURE HUNTING



The final considerations for enhanced automation involve the development of an implementation plan where the classic tradeoff is between cost and schedule. Be sure your plan addresses the following issues, which are discussed in the *Technical Options Guidebook*:

- Scheduling/sequencing of work
- Vendor selection
- Occupant notification
- Permitting, construction, and installation procedures
- Testing and commissioning
- Staff training
- Service and support
- Available incentive programs.

Rewards await those willing to investigate the benefits of enhanced automation.

If you have taken the time to evaluate the exceptional benefits of enhanced automation and its true potential for your facilities, you may have already discovered that enhanced automation is right for you. If it is, now is the time to take action and reap the rewards. Remember, the California Energy Commission is here to help as an objective resource.

Good luck, and good fortune, in your treasure hunting.

Have you heard?

Enhanced automation helps Foothill-De Anza Community College save \$30,000 a year in energy costs and better manage energy use throughout the campus.

For the full story, see Enhanced Automation Case Study 4.



Enhanced Automation Resources

Call the Enhanced Automation Hotline at (866) 732-5591

Email enhancedautomation@xenergy.com

Visit the web site at www.ConsumerEnergyCenter.org/enhancedautomation

The California Energy Commission offers additional resources for enhanced automation, including:

- Vendor lists for enhanced automation technologies and contractors;
- Case studies on successful enhanced automation projects;
- *Technical Options Guidebook*, which provides more detail on the multitude of enhanced automation technologies; and
- Customized technical and economic assessment assistance.

Government Sources

California Energy Commission (www.energy.ca.gov)

The California Energy Commission web page lists many sources of funding available throughout the state for energy efficiency and demand-reduction projects. A web site dedicated to rebates, loans, and grants is found at:

<http://www.ConsumerEnergyCenter.org/index.html>

A list of the California electric utility companies, including investor owned utilities, municipal utility companies, rural electric cooperatives, and irrigation district systems can be found at:

<http://www.energy.ca.gov/electricity/utilities.html>

The California Independent System Operator (www.caiso.com)

California ISO's web page has links to sources of information for energy efficiency and other informative sites specific to California. Additionally, this web site provides information on energy prices, including daily-predicted supply and demand:

<http://www.caiso.com/PowerCentral/conservation.html>

Utilities

Pacific Gas & Electric (www.pge.com)

PG&E has a web page with all their resources for businesses, including incentives, descriptions of various energy-efficiency projects, and tools for measuring energy savings:

http://www.pge.com/003_save_energy/003b_bus/index.shtml

Southern California Edison (www.sce.com)

SCE provides information on incentive programs, services provided by the utility to its customers, and information on energy-saving products (such as lighting controls):

http://www.sce.com/sc3/010_bus_sols/010a_small_business/010a3_elec equip_info/default.htm

San Diego Gas & Electric (www.sdge.com)

SDG&E provides a list of its energy-efficiency programs at:

http://www.sdge.com/efficiency/bus_rebates.html

CALIFORNIA ENERGY COMMISSION



William J. Keese, *Chairman*

Commissioners:

Robert A. Laurie

Robert Pernell

Arthur H. Rosenfeld

James D. Boyd

Steve Larson, *Executive Director*

This program is brought to you by the
Energy Efficiency and Demand Analysis Division
of the California Energy Commission

For more information,
please contact 1-866-732-5591
email enhancedautomation@xenergy.com
or visit www.ConsumerEnergyCenter.org/enhancedautomation



STATE OF CALIFORNIA
Gray Davis, *Governor*

